

EL CORONADO RANCH HABITAT CONSERVATION PLAN 2011 FISH MONITORING REPORT



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November 2011



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ACKNOWLEDGEMENTS

The completion of the 2011 El Coronado Ranch Habitat Conservation Plan fish monitoring could not have been accomplished without the cooperation and assistance from the following HCP partners and volunteers: Josiah and Valer Austin (El Coronado Ranch), Jeremy Voeltz (Arizona Fish and Wildlife Conservation Office, and Jason Kline and Don Mitchell (Arizona Game and Fish Department).



Yaqui chub



Yaqui catfish



Mexican stoneroller



longfin dace

INTRODUCTION

In 1998, El Coronado Ranch owners Josiah and Valer Austin entered into Arizona's first Habitat Conservation Plan (HCP), which allowed cattle ranch operations to continue while at the same time instituting conservation measures for the federally endangered Yaqui chub *Gila purpurea*. The El Coronado Ranch HCP and Implementation Agreement (USFWS 1998a; 1998b) require that monitoring and reporting on the success of conservation measures occur annually for the first five years of the permit. Coleman (2002) provided a thorough review of the biogeography of Rio Yaqui fishes in Arizona and the HCP study area (Figure 1), along with recent management efforts and results of fish monitoring conducted in 2000 and 2001. In 2003, the Arizona Fish and Wildlife Conservation Office (previously Fishery Resources Office) assumed responsibility to coordinate HCP fish monitoring efforts with the San Bernardino National Wildlife Refuge, and reports (Brouder 2003, 2004, 2006; Voeltz 2006; Johnson 2007; Voeltz 2009, Voeltz 2010) summarizing these activities were provided to all interested parties. This year San Bernardino NWR assumed full responsibility of the HCP monitoring and associated report. This report summarizes results of the 2011 El Coronado Ranch HCP fish monitoring effort that continued to follow procedures outlined in the finalized El Coronado Ranch HCP Monitoring Plan (Coleman and Minckley 2003). Appendix A provides a summary table comparing this year's results with past monitoring results (Brouder 2005, 2006; Voeltz 2006, Johnson 2007; Voeltz 2009, Voeltz 2010).

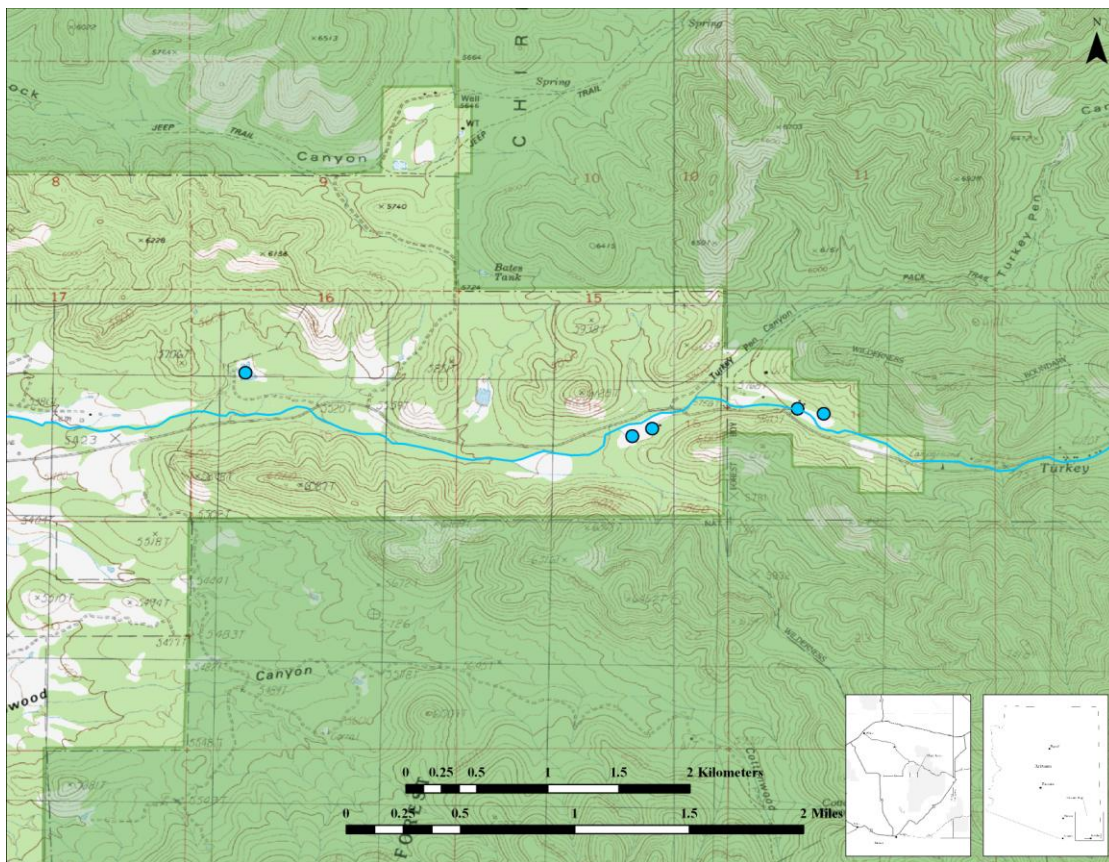


Figure 1. General locations of El Coronado Ranch and Its Impoundments.

WEATHER AND OTHER INFLUENCES DURING YEAR

Since last year's monitoring effort there have been many negative impacts that have affected the El Coronado Ranch Fish. The last measurable/significant precipitation prior to the 2011 monsoons was October of 2010. The Chiricahua Mountains had no snow pack because of this lack of precipitation, which significantly affected vegetation in the spring, as well as available water in West Turkey Creek. On May 8, the Horseshoe II fire started in Horseshoe Canyon and reached the upper canyons that feed West Turkey Creek in early June. The fire was finally contained, after several stop overs and crowning runs on June 25. Several of the upper canyons in the Chiricahua Mountains suffered devastating fires.

San Bernardino NWR Staff made two salvage trips (June 1 and June 22) to El Coronado Ranch (ECR) to remove fish from ponds and West Turkey Creek. These salvage efforts were initiated for two reasons, first the ranch ponds were drying, and second, because of the fire, it was anticipated that when the monsoons arrived, water quality in the drainage would decrease to a point that the survivability of fish would be compromised due to ash and increased sediment loads from erosion of the upper canyons. Approximately 1,500 Yaqui chub and 225 Mexican stonerollers were removed from various locations on the ranch. Of the Yaqui chub, 1,200 were released into Upper Chalk Tank on the Bar Boot Ranch, while the remaining Yaqui chub and all of the Mexican stonerollers were divided between the Refuge Headquarters and the Arizona-Sonora Desert Museum (ASDM) for holding until such time that they can be released.

In addition to the fish moved to Bar Boot Ranch, Refuge Headquarters, and ASDM, refuge staff moved roughly 100 Yaqui chub into the house fountain at ECR. A week later, Dr. Robert Minckley moved another 500 Yaqui chub into the house fountain. On July 19, refuge staff were called to ECR by one of the owners to address fish mortalities in the house fountain. It was theorized there were too many fish in the fountain, so refuge staff trapped the fountain and moved 350 fish into the garden pond near the main house.

Several floods were experienced in West Turkey Creek, a few of which exceeded the banks of the creek and negatively affected Tennis Court and Lodge Ponds, depositing large amounts of sediment and ash. The floods had the expected effects in the drainage; increased sediment, ash depositing, decreased invertebrate populations, and diminished habitat through filling of deep pools in the stream bed.

EL CORONADO RANCH PONDS SURVEY

Big Tank

Methods

One 20-m trammel net and one 50-m trammel net were fished for approximately 25 hours each on a continuous period from 8:00 am, October 4 to 9:00 am, October 5, 2011 (weather, moderate rain and lightning, did not permit the deployment of nets on October 3). The nets were checked twice, once at approximately 4:00 pm on the 4th and then again at 9:00 am on the 5th when they were pulled from Big Tank. No other trapping methods were utilized this year. Yaqui catfish *Ictalurus pricei* captured were measured for total length (TL; mm) and weighed (WT; g). Yaqui catfish captured were also scanned for the presence of a Passive Integrated Transponder (PIT) tag and fin clipped for genetic analysis. Black crappie *Pomoxis nigromaculatus* and green sunfish *Lepomis cyanellus* were counted and removed permanently.

Results

Only 2 Yaqui catfish were caught (between October 4, 4:00 pm and October 5, 9:00 am). The Yaqui catfish collected had a total length of 430 and 410 mm, respectively, and weighed 780, and 710 g, respectively. All the Yaqui catfish collected were recaptures (Tables 1 and 2); although a complete history on the PIT tag data for the Table 1 fish could not be located.

Table 1. Mark-recapture history of Yaqui catfish PIT tag # 53263B1B24 captured during El Coronado Ranch HCP monitoring in October 2011.

Date	Location	Mark(M)/ Recapture (R)	TL (mm)	WT (g)
*10-26-00	Lisa Tank	M	262	567
10-5-11	Big Tank	R	430	780

Table 2. Mark-recapture history of Yaqui catfish PIT tag # 532648322B captured during El Coronado Ranch HCP monitoring in October 2011.

Date	Location	Mark(M)/ Recapture (R)	TL (mm)	WT (g)
10-26-99	Lisa Tank	M	217	-
*10-14-00	Lisa Tank	R	282	624
6-24-09	Big Tank	R	401	670
10-5-11	Big Tank	R	410	710

*All fish from Lisa Tank were moved to Big Tank in 2000

Discussion

Yaqui catfish captures continue to be low; but recaptured fish over the years tend to be unique (meaning, with the exception of two fish, we are not recapturing fish that have previously been captured in Big Tank). However, since re-encountered Big Tank fish are rare, it is difficult to get a population estimate to determine how many of the original 254 Yaqui catfish that were stocked remain, or if any reproduction has occurred (several catfish have been caught over the years without PIT-tags – either they shed their tags or were a result of reproduction, as all 254 stocked fish were tagged). Since the fish were from the 1996 year class from the hatchery, they are now ~15 years old, which has exceeded the reported maximum life-span for the related channel

catfish *Ictalurus punctatus*, which sometimes lives more than 10 years, but typically does not exceed six or seven years (Pflieger 1997).

Captures of green sunfish in Big Tank continue to increase in numbers, while black crappie appear to be decreasing. It was discussed after the 2009 monitoring effort to do a rehabilitation on Big Tank, mostly to; 1) collect as many Yaqui catfish as possible to develop a population estimate and attempt to document recruitment, 2) remove all non-natives, green sunfish and black crappie, 3) and attempt to capture any longfin dace *Agosia sp.* or Yaqui chub that have been stocked several times, yet never recaptured. The rehab was not carried out due to significant winter precipitation in the area leading to maximum capacity water levels in Big Tank.

Table 3. Numbers of fish collected between 2003 and 2011 from monitoring at Big Tank (effort and monitoring season is not the same for each year).

Year	<u>Yaqui catfish</u>	<u>Black crappie</u>	<u>Grass carp</u>	<u>Green sunfish</u>
2003	2	20	1	0
2004	1	11	0	0
2005	2	0	0	0
2006	3	5	0	0
2007	3	0	0	0
2008	2	15	0	3
2009	12	137	0	24
2010	5	*	*	*
2011	2	7	0	33

*data unavailable

Tennis Court Pond

Methods

Twelve minnow traps were fished overnight (1430-hr to 0730-hr) on October 3-4, 2011 in the Tennis Court Pond.

Results

There were no captures in approximately 17 hours of sampling.

Discussion

Tennis Court Pond has high numbers of Yaqui chub when the pond consistently holds water (Table 4). However, the pond dried in 2006, and no fish were collected in 2006 or 2007. In October 2007 (following the fall monitoring effort), 68 Yaqui chub were relocated from Lower Guesthouse Pond to re-establish the population in Tennis Court Pond. The explosion in population size between 2008 and 2009 can be attributed to consistent water levels in the pond.

This year the pond once again dried prior to the monsoon season. No fish were stocked into Tennis Court Pond from other locations on the ranch due to the effects of the Horseshoe II fire which, because of post-fire flooding, deposited large amounts of ash and sediment into the pond and also a general lack of sufficient numbers of Yaqui chub throughout the ranch.

Table 4. Numbers of fish collected between 2003 and 2009 from Tennis Court Pond.

Year	Longfin dace	Yaqui chub
2003	0	799
2004	0	413
2005	0	363
2006	0	0
2007	0	0
2008	0	70
2009	0	1264
2010	0	1023
2011	0	0

Lodge Pond

Methods

Twelve minnow traps were fished overnight (1530-hr to 0900-hr) on October 3-4, 2011 in the Lodge Pond. A sub-sample of fish collected were measured and immediately released back into Lodge Pond. CPUE was calculated as the number of fish/total hours of netting.

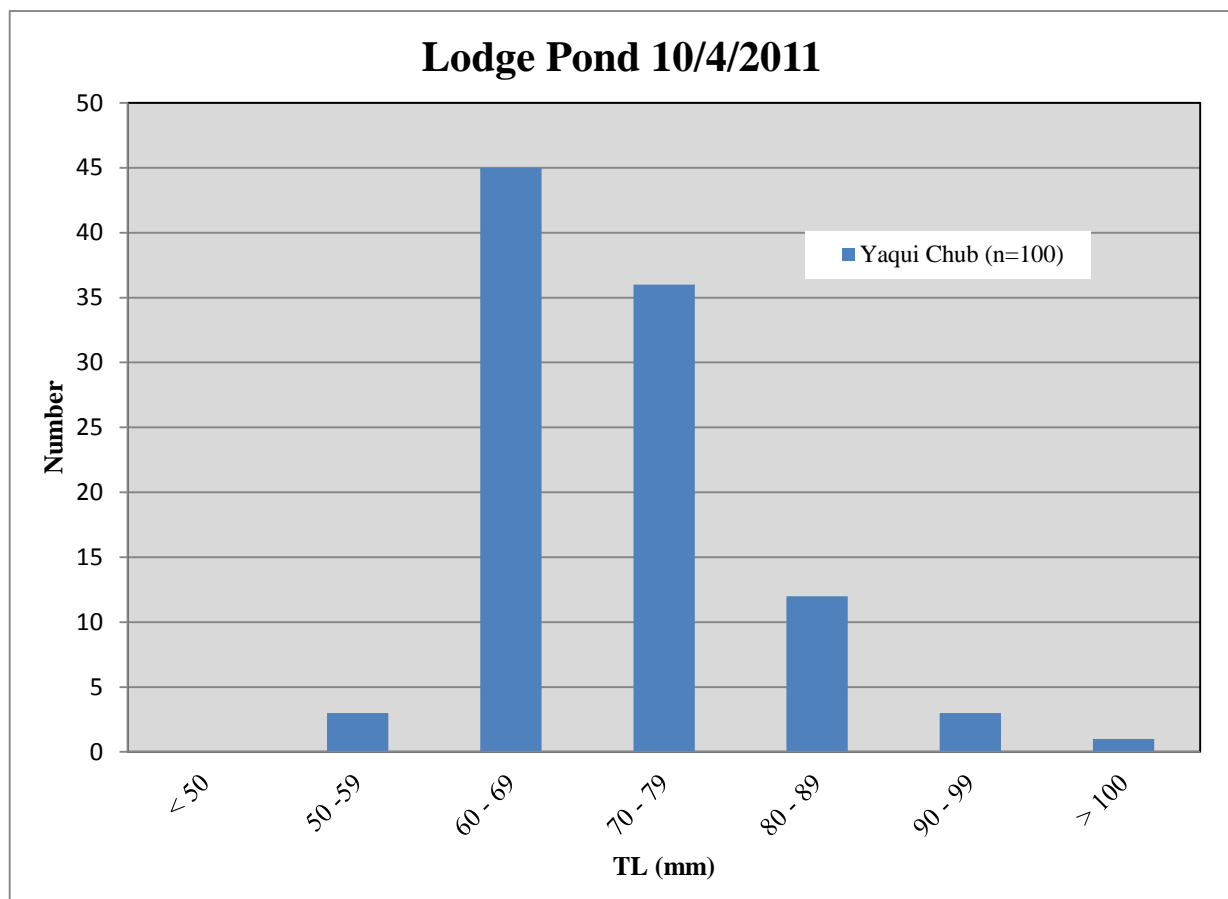


Figure 2. Length-frequency histogram of a sub-sample of Yaqui chub collected in Lodge Pond during El Coronado Ranch HCP monitoring in October 2011.

Results

A total of 113 Yaqui chub were collected in approximately 17.0 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 0.5539 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 70.52 mm and ranged in size from 56 to 104 mm. The majority (45%) of fish in the measured sub-sample were of the 60-69 mm modal length class. There were no fish in the < 50 mm modal class length. (See Figure 3 below)

Discussion

Although not a traditional standard sampling site, Lodge Pond has been monitored in October 2006 – 2011 (Table 5) due to salvage efforts that occurred on May 31, 2006 (Voeltz 2006, Johnson 2007) and the restocking of 42 Yaqui chub on November 7, 2006 (Johnson 2007). Lodge Pond should continue to be sampled every year from now on, and fish used for re-establishment throughout the ranch, as needed. In addition, Yaqui topminnow should be stocked under the AGFD's (Arizona Game and Fish Department) Safe Harbor Agreement for topminnows and pupfish in Arizona (AGFD 2007).

Table 5. Numbers of fish collected between 2006 and 2011 from Lodge Pond.

Year	<u>Longfin dace</u>	<u>Yaqui chub</u>	<u>Mexican stoneroller</u>
2006	0	0	-
2007	0	4	0
2008	0	237	1
2009	0	1531	0
2010	0	862	0
2011	0	113	0

Upper Guesthouse Pond

Methods

Twelve minnow traps were fished overnight (1600-hr to 0930-hr) on October 3-4, 2011 in the Upper Guesthouse Pond.

Results

There were no captures in approximately 16.5 hours of sampling.

Discussion

The lack of captures in Upper Guesthouse Pond is of concern (Table 6). While fish were salvaged from the location in June, it was by no means a complete salvage. A representative sample was collected, approximately 450 individuals by refuge staff, with possibly another 200-300 individuals captured by Dr. Minckley. In addition, the pond was unaffected by the fire or flooding from the fire and water quality and vegetation at the time of the survey were well within normal. Many invertebrates were observed as well as bullfrog tadpoles and one tiger salamander (*Ambystoma tigrinum*) larva. 350 Fish were collected from Horse Tank, just west of the main house, and stocked into Upper Guesthouse Pond and Dale's Tank.

Table 6. Numbers of fish collected between 2003 and 2011 from Upper Guesthouse Pond.

Year	<u>Longfin dace</u>	<u>Yaqui chub</u>
2003	0	1
2004	0	0
2005	11	240
2006	110	0
2007	0	0
2008	0	52
2009	6	2151
2010	0	1131
2011	0	0

Lower Guesthouse Pond*Methods*

Twelve minnow traps were fished overnight (1600-hr to 0930-hr) on October 3-4, 2011 in the Lower Guesthouse Pond. CPUE was calculated as the number of fish/total hours of netting. CPUE was calculated as the number of fish/total hours of netting. CPUE was calculated as the number of fish/total hours of netting.

Results

A total of 2 Yaqui chub were collected in about 16.5 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 0.009254 fish/hour. The number of fish captured was too small to allow for any true statistical analysis of age structure. The fish were 75 mm and 71 mm in length.

Discussion

The lack of numbers of fish captured in Lower Guesthouse Pond is alarming (Table 7). As with Upper Guesthouse Pond, Lower Guesthouse Pond no effects from the fire or subsequent erosion. Vegetation and water quality were observed to be at or near normal levels.

Table 7. Numbers of fish collected between 2004 and 2009 from Lower Guesthouse Pond.

Year	<u>Longfin dace</u>	<u>Yaqui chub</u>
2004	0	0
2005	27	19
2006	11	0
2007	2	66
2008	35	132
2009	0	616
2010	0	1684
2011	0	2

Ponds Summary

Following the severe drought conditions that dried, or nearly dried, all of the ponds on the ranch in 2006, the Yaqui chub populations had rebounded in all four regularly sampled ponds by 2008 (Figure 6). This was a result of restocking Tennis Court and Lodge ponds in 2007, and natural dispersal to Upper and Lower Guesthouse ponds. Unfortunately, this year's drought and fire effects set us back to 2006 levels. It is planned in the spring of 2012 to restock all of the ponds with the fish that were salvaged in June, provided water quantity and quality are adequate.

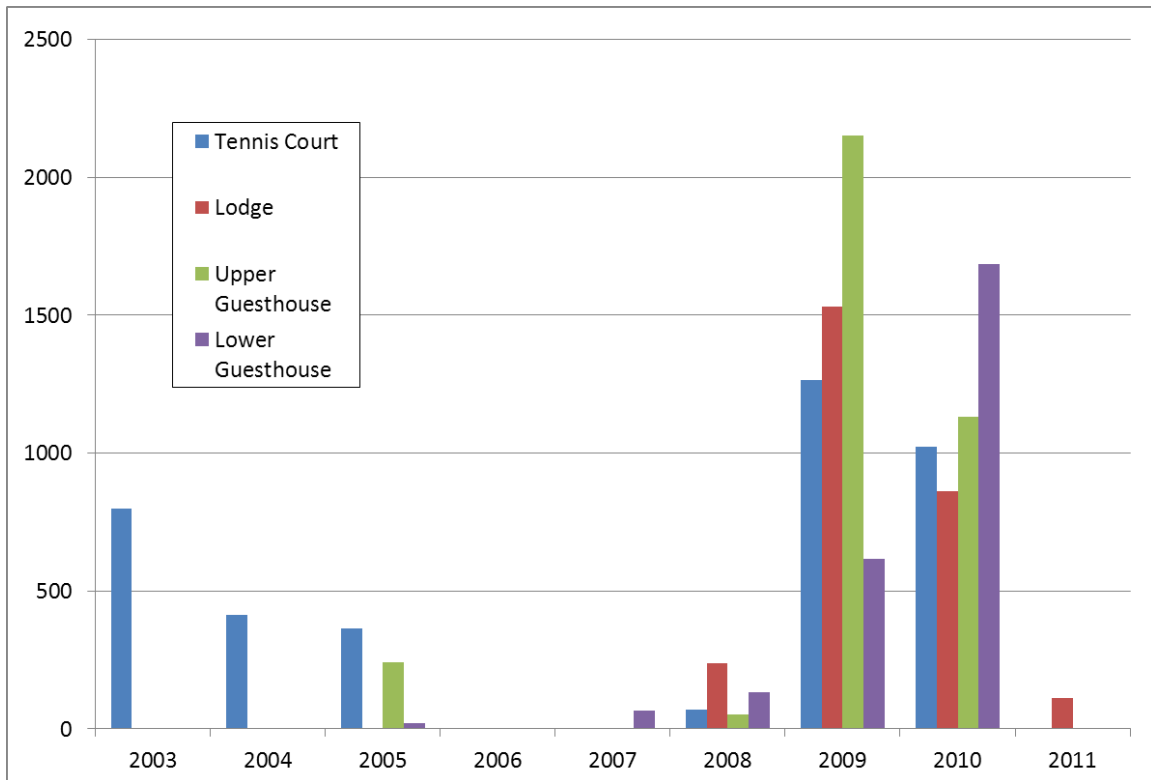


Figure 3. Total numbers of Yaqui chub collected from four ponds during El Coronado Ranch HCP monitoring in October 2004 - 2009.

WEST TURKEY CREEK SURVEY

Methods

A Smith-Root, Inc. Model LR-24 backpack electrofishing unit (settings: 150-200 volts, 30 Hz, output ~0.4 amps) was used to sample all three standard monitoring sites of West Turkey Creek, and all three standard sites on the USFS (U.S. Forest Service) lands on October 13 and 14, 2009 (Appendix B). Each standard site is 100-m long and was shocked from downstream to upstream, with actual shocking seconds recorded. All fish captured were identified to species, measured (longfin dace and green sunfish were just counted), and native fish returned alive to West Turkey Creek (green sunfish were removed). CPUE was calculated as the number of fish/minute of shocking.

U.S. Forest Service Sites

[(USFS-1) – Dispersed Campsite]

[(USFS-2) – Upper Sycamore Campground]

[(USFS-3) – Lower Sycamore Campground]

Discussion

None of the Forest Service sites were shocked this year, but all were visually inspected. The erosion from the burn caused pools to be filled in and increased particulate matter in the creek. Very few invertebrates were observed at any of the sites and water levels were beginning to drop at the time of the survey, with several stretches not flowing.

El Coronado Ranch Site 1

Results

One Yaqui chub was captured in 511 seconds of effort at ECR-1. Yaqui chub CPUE at this site was 0.001957 fish/min. The length of the 1 Yaqui chub captured was 76 mm.

Discussion

The lack of captures, while a concern, is not unexpected. This site, as with all of the following sites in West Turkey Creek, experienced uncontrolled aggradation of sediment and ash from run-off of burned areas in the upper canyons above El Coronado Ranch. While the number of fish salvaged from West Turkey Creek prior to the monsoon floods is not a huge number it will provide for a strong reseeding population.

Table 8. Numbers of fish collected between 2003 and 2011 from ECR-1.

Year	<u>longfin dace</u>	<u>Yaqui chub</u>	<u>Mexican stoneroller</u>
2003	0	19	-
2004	1	25	-
2005	12	32	-
2006	1	12	-
2007	55	25	7
2008	72	16	36
2009	67	23	30
2010	11	36	76
2011	0	1	0

El Coronado Ranch Site 2

Results

No fish were captured in 383 seconds of effort at ECR-2

Discussion

See ECR-1. In addition to the Mexican stonerollers and Yaqui chub salvaged from West Turkey Creek, many of the Yaqui chub salvaged from the ponds can be stocked into upstream sections of West Turkey Creek which should act as stock for both the ponds and the creek.

Table 9. Numbers of fish collected between 2003 and 2011 from ECR-2.

Year	<u>longfin dace</u>	<u>Yaqui chub</u>	<u>Mexican stoneroller</u>
2003	2	0	-
2004	3	5	-
2005	45	0	-
2006	0	0	-
2007	32	0	1
2008	47	17	31
2009	37	0	19
2010	50	184	79
2011	0	0	0

El Coronado Ranch Site 3

Results

A total of 7 longfin dace collected during 665 seconds of effort at ECR-3. Longfin dace CPUE at this site was .0105 fish/min.

Discussion

As with the other to ECR sites number of fish collected was minimal. On the positive side no green sunfish were captured, but with the numbers of green sunfish captured in Big Tank, the chances of encountering green sunfish next year in this reach and the reach above the fish barrier are likely.

Table 10. Numbers of fish collected between 2003 and 2009 from ECR-3.

Year	<u>longfin dace</u>	<u>Yaqui chub</u>	<u>green sunfish</u>	<u>Mexican stoneroller</u>
2003	134	0	1	-
2004	31	1	22	-
2005	321	0	18	-
2006	0	0	4	-
2007	78	1	8	0
2008	362	1	2	7
2009	326	0	3	14
2010	568	122	2	2
2011	7	0	0	0

El Coronado Ranch Random Site 1

Results

No fish were collected in 366 seconds of effort.

Discussion

The lack of captures is concerning, but expected. Water levels were adequate and the water had fewer particulates than other sites, but there was still a lack of invertebrates in this reach. This site is located approximately 100 m upstream from the corrals in West Turkey Creek and begins above the junction of Turkey Pen Canyon and West Turkey Creek. UTM (NAD83/WGS84) 3527086 N 653789 E

El Coronado Ranch Random Site 2

Results

In 1,512 seconds of effort 1 Yaqui chub (79 mm) and 1 Mexican stoneroller (127 mm) were collected.

Discussion

Once again there was a significant lack of fish collected due to effects from the fire. However, this is the only section that a Mexican stoneroller was found. This site was completed in the reach of West Turkey Creek just below ECR-Site 3. UTM (NAD83/WGS84) 352690 N 650829 E

FUTURE MONITORING AND MANAGEMENT RECOMMENDATIONS

Monitoring

- In addition to sampling the six fixed monitoring sites on West Turkey Creek, continue sampling random sites to document the expansion/contraction of fish populations and to detect any new species that may not be found in the fixed sites.
- Continue to record each sampling gear and more importantly the number of each species collected in that gear separately. This is needed so that a mean CPUE, variance, and confidence intervals can be generated for each gear type and species. Mean CPUEs and confidence intervals are needed to detect changes in population trends. CPUEs generated from “pooled” data (i.e., 10 traps catching 10 fish over a period of 10 hours equaling a CPUE of 10fish/100 hours) do not allow for means, variances, and confidence intervals to be calculated.
- Continue to measure and record total length of all native fishes collected to allow for the development and interpretation of length-frequency histograms. Length-frequency histograms will also reduce biologist subjectivity with regards to categorizing fish as either juvenile or adult. Having multiple measuring boards and data books will allow for quicker processing as well.
- All Yaqui catfish captured should continue to be measured for total length, weighed, and scanned for the presence of a PIT tag. All “unmarked” catfish should have a PIT tag inserted and PIT tag number recorded.
- Continue implementing HACCP policy of disinfecting sampling gear used at one site before the use at another site in an effort to reduce inadvertent introductions of parasites or pathogens into uninfected waters. To date, Asian fish tapeworm has not been documented from any fish collected from West Turkey Creek or El Coronado Ranch.

Management

- During suitable water levels, pump Big Tank dry. Salvage all Yaqui catfish during the project, and eliminate all green sunfish and black crappie. Depending on numbers of Yaqui catfish, translocate some to pond(s) on the Bar Boot Ranch, or return them to Big Tank when it fills.
- During annual monitoring efforts (if sufficient numbers of fish are available and suitable habitat is present) translocate Yaqui chub, longfin dace, and Mexican stoneroller (n = 25-50; each) from either West Turkey Creek or El Coronado Ranch ponds to West Turkey Creek on Forest Service lands, upstream of El Coronado Ranch boundary.
- During annual monitoring efforts, translocate any Mexican stoneroller and Yaqui chub from below the fish barrier to above the fish barrier.
- Yaqui topminnow should be stocked into at least Lodge Pond under AGFD's Safe Harbor Agreement for topminnows and pupfish in Arizona (AGFD 2007).
- When adequate water, quantity and quality, is present at El Coronado Ranch, collect Yaqui chub from Bar Boot Ranch and restock the ponds and West Turkey Creek.
- Explore adding and anchoring woody debris in areas of West Turkey Creek to increase pool habitat favored by Yaqui chub.

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Appendix A. El Coronado Ranch HCP fish monitoring 2009 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2009 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007, Voeltz 2009). Values presented are number of fish caught. Sampling methods: ES=backpack electroshocking; DN=dip net; VO = visual observation; MT=minnow trap; TN=trammel net; GN=experimental gill net; S=seining; HN=hoop net, MHN = mini-hoop net; DNS = did not sample.

Site	Year	Method	Total effort	Yaqui chub	longfin dace	green sunfish	Mexican stoneroller
ECR-1	2004	ES	1800 s	25	1	-	-
	2005	ES	390 s	32	12	-	-
	2006	ES	791 s	12	1	-	-
	2007	ES	759 s	25	55	-	7
	2008	ES	605 s	16	72	-	36
	2009	ES	242 s	23	67	-	30
	2010	ES	797 s	67	30	23	-
	2011	ES	511 s	1	-	-	-
ECR-2	2004	ES	827 s	5	3	-	-
	2005	ES	-	-	45	-	-
	2006	ES	486 s	-	-	-	-
	2007	ES	510 s	-	32	-	1
	2008	ES	557 s	17	47	-	31
	2009	ES	163 s	-	37	-	19
	2010	ES	1069 s	50	184	79	-
	2011	ES	383 s	-	-	-	-
ECR-3	2004	ES	928 s	1	31	22	-
	2005	ES	1405 s	5	45	13	-
	2006	ES	569 s	1	-	3	-
	2007	ES	673 s	1	78	8	-
	2008	ES	951 s	1	362	2	7
	2009	ES	415 s	-	326	3	14
	2010	ES	2039 s	568	122	2	2
	2011	ES	665 s	-	7	-	-

Appendix A (continued). El Coronado Ranch HCP fish monitoring 2009 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2009 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007, Voeltz 2009). Values presented are number of fish caught. Sampling methods: ES=backpack electroshocking; DN=dip net; VO = visual observation; MT=minnow trap; TN=trammel net; GN=experimental gill net; S=seining; HN=hoop net, MHN = mini-hoop net; DNS = did not sample.

Site	Year	Method	Total effort	Yaqui chub	longfin dace	Mexican stoneroller
Tennis Court Pond	2004	HN	32.0 h	-	-	-
		MT	96.0 h	413	-	-
	2005	MT	177.0 h	363	-	-
	2006	MT	216.0 h	-	-	-
	2007	MT	198.0 h	-	-	-
	2008	MT	210.0 h	70	-	-
	2009	MT	204.0 h	1264	-	-
	2010	MT	176.0 h	1023	-	-
Lodge Pond	2011	MT	204.0 h	-	-	-
	2004	DNS	-	-	-	-
	2005	DNS	-	-	-	-
	2006	MT	100.2 h	-	-	-
	2007	MT	198.0 h	4	-	-
	2008	MT	216.0 h	237	-	1
	2009	MT	210.0 h	1531	-	-
	2010	MT	176.0 h	862	-	-
Upper Guest House Pond	2004	HN	42.0 h	-	-	-
		MT	84.0 h	-	-	-
	2005	S	702 m ²	240	11	-
	2006	S	600 m ²	-	110	-
	2007	MT	189.0 h	-	-	-
	2008	MT	216.0 h	52	-	-
	2009	MT	222.0 h	2151	6	-
	2010	MT	192.0 h	1131	-	-
Upper Guest House Pond	2011	MT	198.0 h	-	-	-

Lower Guest House Pond	2004	HN	45.0 h	-	-	-
	2005	S	180 m ²	19	27	-
	2006	S	230 m ²	-	11	-
	2007	MT	173.3 h	66	2	-
	2008	MT	222.0 h	132	35	-
	2009	MT	222.0 h	616	-	-
	2010	MT	192.0	1684	-	-
	2011	MT	198.0 h	2	-	-

Appendix B. Locations of monitoring sites on the El Coronado Ranch.

Tennis Court Pond. Located upstream of the Austin's office. Drive east along the road past the basketball court and tennis court. UTM (NAD83/WGS84) 3526947 N 654567 E

Lodge Pond. Located at the Austin's main building. UTM (NAD83/WGS84) 3527020 N 654387 E

Upper Guesthouse Pond. Located next to the guesthouses across the street from the El Coronado Ranch driveway. The upper pond is at the end of the circular driveway and has a stone dock. UTM (NAD83/WGS84) 3526867 N 653518 E

Lower Guesthouse Pond. Located immediately downstream of Upper Guesthouse Pond. UTM (NAD83/WGS84) 3526816 N 653405 E

Big Tank. Drive through the lower-most iron pipe gate on the north side of Turkey Creek road. Follow road to the tank. UTM (NAD83/WGS84) 3527188 N 651093 E

El Coronado Ranch Site 1. (ECR-1) Drive to the El Coronado Ranch guest houses. Follow the road through the turnaround by the last two houses, you will see the Upper Guesthouse pond. The road continues along the pasture fence where you will see the lower guesthouse pond. After the pasture, the road turns sharply to the left. Approximately 50m after the turn you will see another road on the right, turn right onto the orchard road. It will go down a hill, past an open field and a stock tank on the left. As you pass the western embankment of the stock tank the road will slope downward. Stop there. There will be a low point where a small outflow from the tank crosses the road. Follow the outflow NW until it meets West Turkey Creek. This is the upper point of the reach. Walk 100-m downstream and shock upstream. UTM (NAD83/WGS84) 3526655 N 652757 E.

El Coronado Ranch Site 2. [(ECR-2) – below Big Tank diversion] Begin below Big Tank infiltration intake (diversion). This site can be reached two different ways. First, is to drive down the orchard road past the ECR-1 site, and turning right before the road crosses the Cold Pit drainage. The road will cross West Turkey Creek just above the diversion. Second, drive down Turkey Creek road from the Austin's driveway to the first cattle guard. Go through a Texas gate (barbed wire gate) on the south side of the road before the cattle guard and follow the two-track road to the diversion site. UTM (NAD83/WGS84) 3526638 N 652468 E.

El Coronado Ranch Site 3. [(ECR-3) – Big Tank outflow barrier to lower boundary] Lowest barrier. Park at the very first cattle guard as you drive onto the El Coronado Ranch from Turkey Creek road, this is also the first cattle guard after Sander's house. There is a Texas gate (barb wire gate) on the north side of the road by the cattle guard. Go through the gate and walk down to the creek bottom. Follow the creek upstream until you reach the barrier. Walk 100-m downstream and shock upstream. UTM (NAD83/WGS84) 3526932 N 651015 E

U.S. Forest Service Site 1. [(USFS-1) – Dispersed Campsite] This sample site is approximately 0.40 miles from the end of West Turkey Creek road, below the junction of Morse Canyon and

West Turkey Creek. The area was a small campsite that is being restored by USFS. It has sediment barrier fencing and has been seeded. UTM (NAD83/WGS84) 3525431 N 658180 E.

U.S. Forest Service Site 2. [(USFS-2) – Upper Sycamore Campground] Sycamore Campground upper waterfall. Park in Sycamore Campground and walk east until you reach West Turkey Creek. Follow the creek upstream to the base of the uppermost waterfall continuing downstream. UTM (NAD83/WGS84) 3526021N 657749 E.

U.S. Forest Service Site 3. [(USFS-3) – Lower Sycamore Campground] Sycamore Campground lower waterfall. From Sycamore Campground, follow the creek downstream until you reach a rock face (river left) along the stream below campground. Show downstream from that point. UTM (NAD83/WGS84) 3526254 N 657399 E.